



### The Past - Desert Storm



- 525,000 US troops deployed
- 7 month deployment period via ships and air



- 4.65 billion ton-miles (697.5 million for Berlin Airlift)
- 20,500 missions; 534,000 passengers; 542,000 tons
- Ground Forces Example VII Corps Support:
  - 150,000 troops, 50,000 combat vehicles
  - Estimated 800,000 gallons diesel/day consumption
  - Required 3,300,000 gallons diesel/day (11,500 tons)



### The Present - Kosovo



• Quick reaction desired



- Mission / Force Option/ Estimates
  - 8,000 troops to secure border
  - 75,000 troops to liberate Kosovo
  - 200,000 troops to occupy and monitor
- Troop transport not the hard part
  - 240,000 troops to Desert Shield in 1 month
  - Vehicles & support not available for <u>many</u> weeks
- Full Deployment Options
  - Rapid Reaction
  - Tactical Insertion

Air Transport

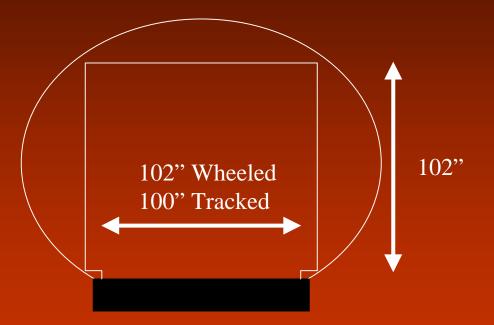
C-130/C-17

- Urgency Rules Out Strategic Sea lift

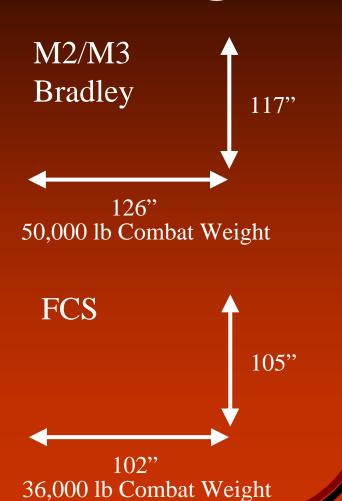


# Deployability & Transportability Challenges

C-130J Size Limitations



C-130J: 36,000-40,000 lb Payload Capacity





# **Design Drivers**



- Weight
  - 40%-50% of manned combat vehicle weight is armor
  - 20% is weapons system
  - 20% is drive train

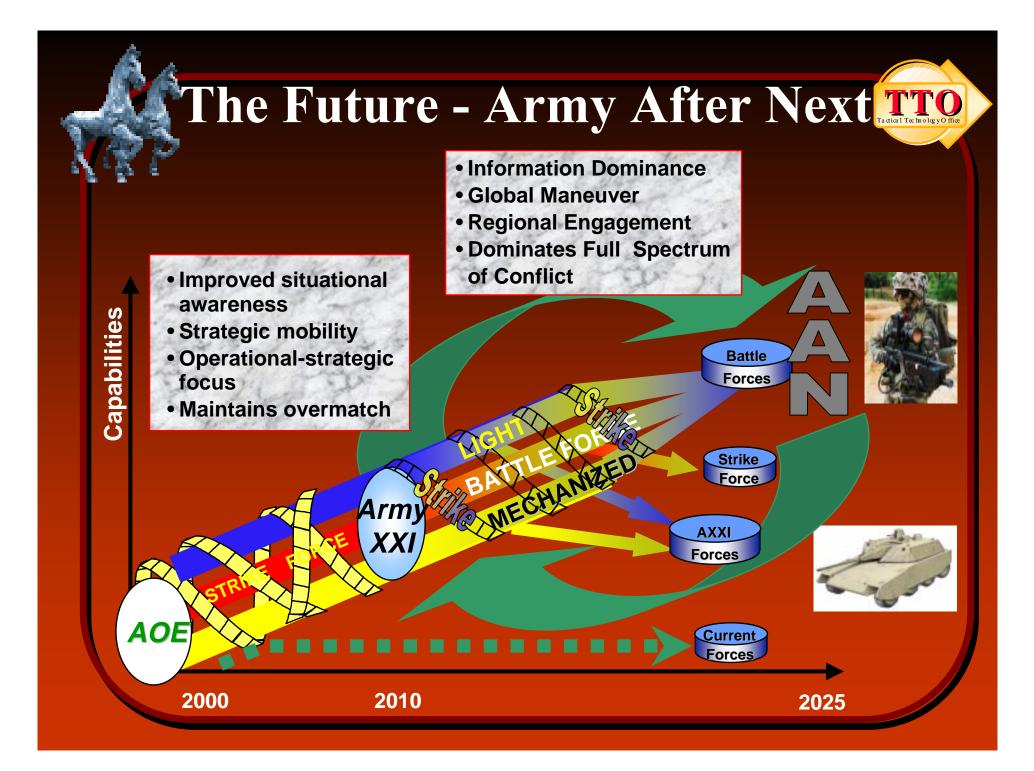


#### • Size

- Vehicle height is determined by human factors
  - > M1 A1 Abrams 3.25 ft. height for reclined driver
  - $\rightarrow$  M3 Bradley  $\geq$  4 ft. for seated troops
- Width
  - > Maximums are transportability related
  - Minimums are subsystem spacing or human factors related



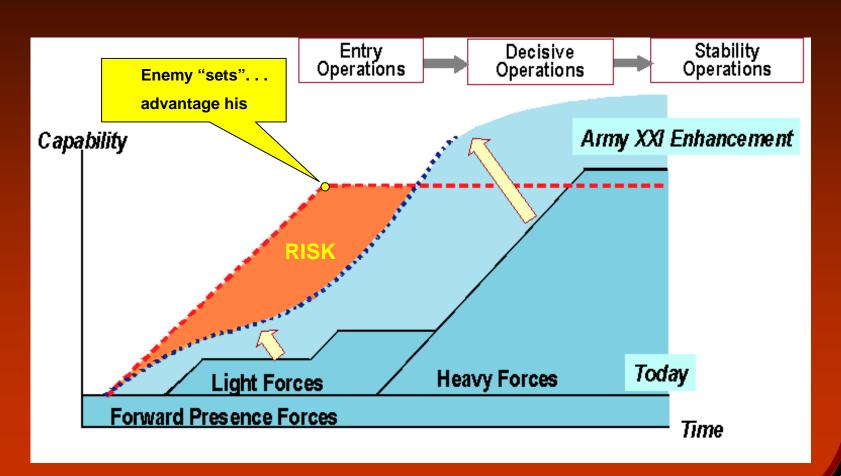
- Volume (MBT)
  - > Approximately 30% of volume is attributed to crew







## What Are We Trying to Fix?





### What Limits Past Solutions?



Bore Pore

**Lethality** 

**Survivability** 

Former
Solutions
Lead to
Bigger,
Heavier
Systems

<u>Mobility</u>

Transportability

Current Need for Reduced Manpower and Costs

Plus

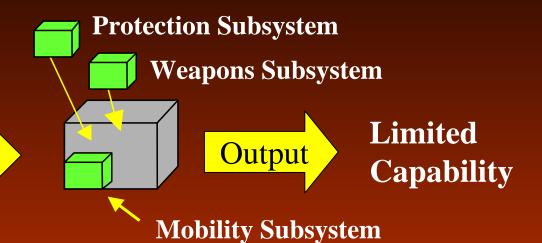
Lack of Forward Basing Invalidates Former Solutions

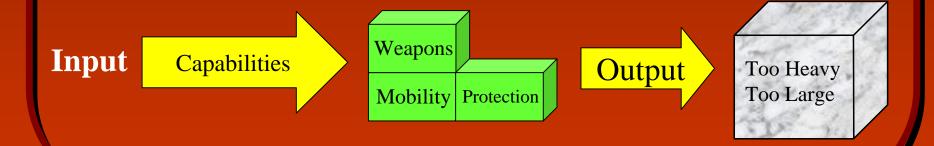


Input

Weight & Volume

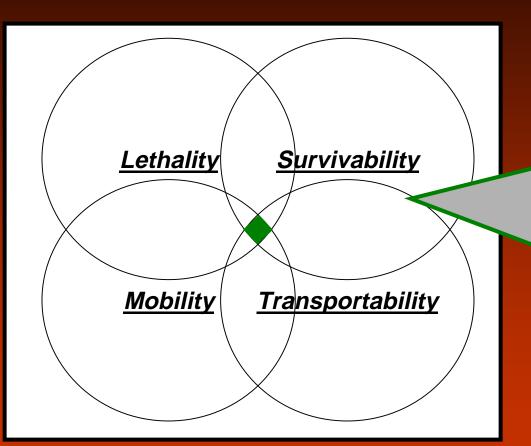
## **Current Design Approaches**







# Multi-Mission Combat Systems TTO - A New Approach



Common Solutions

- Reduced Size
- Reduce/Eliminate

<u>Technologies</u>

Robotics

**Electric Propulsion** 

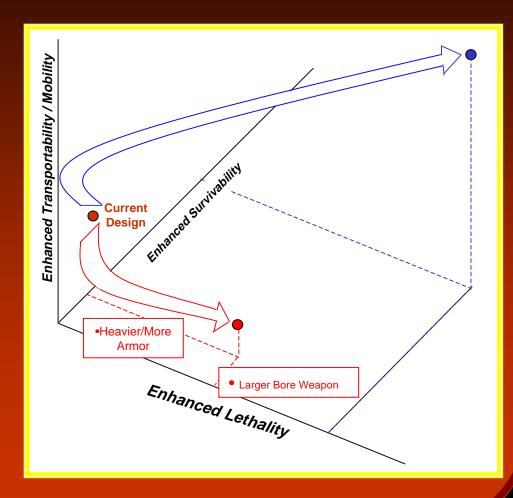
Adv Lethality

Active Protection



# DARPA/Army Study Goals

- Identify potential solutions and new approaches
- Provide convincing data supporting high payoff
- Explore and demonstrate high risk solutions and/or novel approaches to ground combat





# Total Systems Approach Is Needed Tall Television



#### New Design Philosophy

#### Mobility/ **Transportibility**

- Common Prime Power
- All-Wheel Drive
- Advanced Lightweight Materials

Multiplication Virtual Prototypino

Ageorgia gimulation Virtual Prototypino

Minimation Virtual Prototypino Naragement-Robotics

#### Lethality

- Energy Sources
- Launchers
- Missiles
- Smart Munitions

**Systems** 

#### **Information Dominance**

- Intelligence Preparation of the Battlefield (IPB)
- Situational **Awareness**

#### **Survivability**

- Active Defense
- Passive Defense
- Threat Avoidance
- Minimally Manned **Systems**

#### **Supportability**

- Reduced Fuel Dependence
- Reduced Maintenance
- Reduced Life Cycle Costs



# **Multi-mission Systems**



**Security** 

Direct Fire Support

**Indirect Fire Support** 

**Unique Theatre Combat Vehicle** 

Troop Transport

Reconnaissance & Scout

**Targeting** 

**Anti-Infantry** 

**Mine Clearing** 

Logistic Support



# Technologies & Concepts From Existing Programs



SUO

**TMR** 

**UCAV** 

DEMO II / III

Joint Robotics

MALD

**AFSS** 

**DARPA** 

Multi-Mission Combat Systems DoD & Other EM

Gun

ETC Gun

MAV

**CHPS** 

AAV

**RST-V** 

CKEM

Active Defense Systems





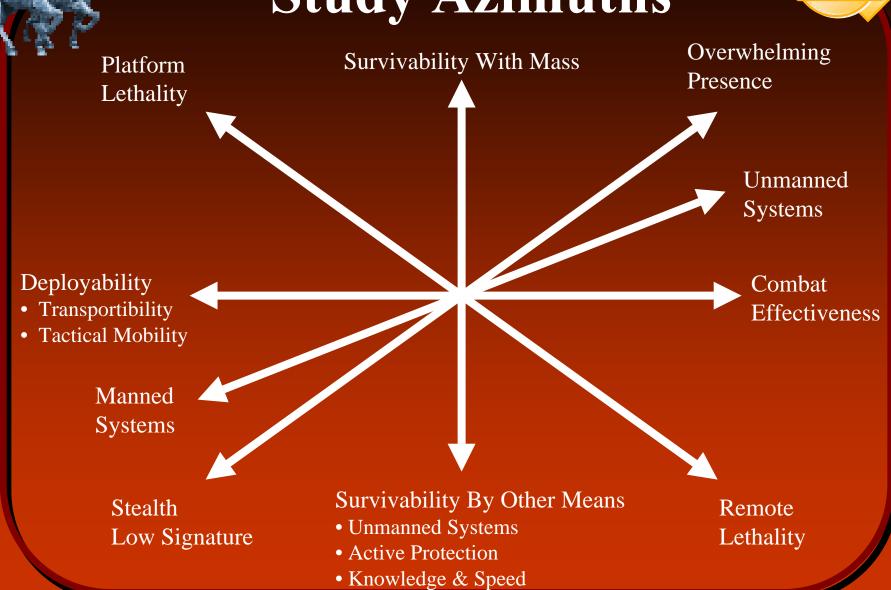


- Use total systems approach for Multi-Mission Combat Systems:
  - Multi-functional/multi-mission capabilities
  - Re-configurable systems
  - Enhanced survivability through manned/ unmanned teaming, active defense, etc.
  - Enhanced lethality/mission effectiveness
  - Enhanced situational awareness
  - Energy and power management with multifunction components



# Study Azimuths







## DARPA Role





DARPA Initiative

Provides the

"Activation

Energy"



Transition
To The
Services

Future Shortfall

GOAL

Current Design Evolution
(Limited Resource Approach)

Time



# Study Program Plan



- Identify high risk/high payoff concepts
- Identify issues with manned/unmanned teaming, advanced weapons systems
- Assess systems capabilities against appropriate missions
- Identify existing program crossovers
- Identify enabling technologies





















# Multi-Mission Combat Systems